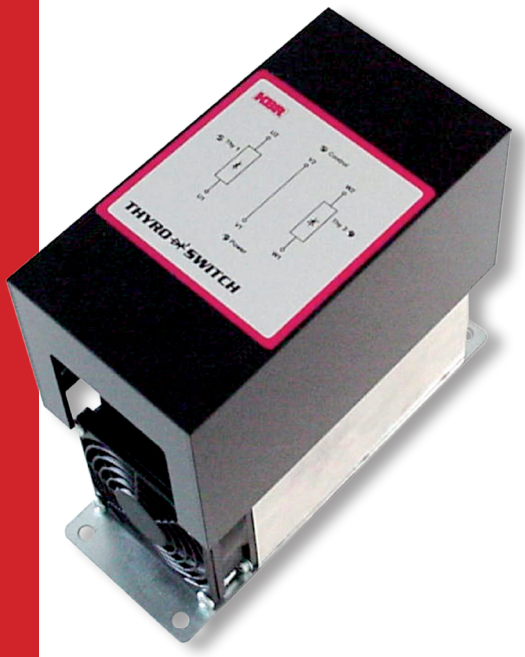
KBR
Energy Management

User manual
Technical parameters

thyro switch



Thyristor switch for reactive current compensation

System | english

EDEBDA0200-2112-1_EN

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Subject to
technical changes

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1 Intended use

The **thyroswitch** is a power electronics component for hooking up capacitive loads to the grid. The device is intended exclusively for installation in switchgear and controlgear. Only detuned (up to 14 %) compensation stages may be switched. First and foremost, symmetrical three phase current compensation is the intended use, but it is also possible to switch two separate alternating current compensation stages simultaneously.

Technical data:

Input:		
- Control input	typically 10V DC-10mA / 30V DC-22mA typically 180V AC-10mA / 260V AC-14mA, 50/60Hz	
- Fusing	max. 6A	
Power supply:		
- Auxiliary voltage	85-265V AC/DC 14VA 50/60Hz no tolerance in either direction	
- Fusing	max. 6A	
Load circuit:		
- Supply voltage U_N	400/500V 50/60Hz depending on type	
- Tolerance U_N	U_N±10	
- Harmonic voltage	acc. to DIN EN 61000-2-4 class 3; THD max. 10%	
- Load current:	70/90/115A depending on type	
- Power dissipation	70A type approx. 2.2W per A 90/115A type approx 2.1W per A	
For power-off time > 5s		
Closure delay:	Input:	- DC: 0 … max. 20ms - AC: 10 … max. 30ms
Reclosure delay:		
at chopping operation	Input:	- DC: 0 … max. 33ms - AC: 10 … max. 43ms
Electrical safety:		
Standards and subsequent amendments		
- Protection class	I	
- Protection type	IP10	
- Overvoltage category	CAT3	

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Ambient conditions:

- Standards and subsequent amendments	DIN EN 60721-3-3/A2 (3K5+3Z11) IEC 721-3-3 (3K5+3Z11)
- Operating temperature	-5°C... +55°C => Please observe power limitation depending on ambient temperature (see page 8).
- Air humidity	5%...95% non-condensing
- Storage temperature	-25°C... +70°C

Installation:

- Position	vertical (recommended) or 45° tilted
- Space for heat discharge	at least 50 mm to the fan and at least 150 mm to the heat sink outlet
Housing: (H x W x D)	70/90A-Typ: 220 x 105 x 188 mm 115A-Typ: 220 x 105 x 198 mm
Weight:	70/90A-Typ: approx. 2900 g 115A-Typ: approx. 3600 g

2 Safety note

Due to the design with forced cooling, i. e. with the use of a fan, particularly the unimpeded air intake must be guaranteed. The cooling openings must not be covered up. The distances specified from neighboring components must be observed.

For rated load, there is an increase in temperature between fresh air and exhaust air of:

- max. 52°C for type 115A
- max. 40°C for type 90A
- max. 35°C for type 70A

Temperature-sensitive components such as cable ducts should be protected accordingly.

The **thyroswitch** may only be operated with a power disconnecting device connected in series.

The **thyroswitch** cannot function alone as a component and must be configured for use with a compensation unit.

In detuned systems, it is absolutely essential that the **thyroswitch** is switched before the inductor and capacitor.

The **thyroswitch** may only be deployed in the context of its intended use.

Even when used only as intended, a defect cannot be ruled out. In this case, the currents and voltages in the load circuit could be affected. The following errors are possible: Current interruption, half-wave operation or constant energy flow. Correct design of protective devices must therefore be ensured during project planning.

Incorrect operation or wrong connections could lead to destruction of the device or the load.

The **thyroswitch** may only be connected with insulated crimp-type cable sockets.

Work such as assembly, maintenance and servicing may only be performed by qualified electricians. A soon as the **thyroswitch** is connected to the power supply system, the capacitive load is charged to to network peak voltage. In addition, a phase is switched directly to the load. This means that the load is under voltage, even when switched off, and remains connected to the power supply. When working on the load, the device must be disconnected from the power supply under all circumstances. **Risk of fatal injury!**

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Even after disconnection from the network, a residual charge remains in the capacitive load. Before working on the equipment, it must be checked that the capacitors are de-energized. The discharge time of the capacitors must be taken into account.

Note: Power capacitors must be equipped with permanently connected discharge devices and be discharged within five minutes to a residual charge of max. 50µC to a voltage of 60V. If this has a disturbing effect on the function of the electrical equipment, a warning sign must be put up in a clearly visible position stating that the discharge time is longer than five minutes. If it is possible to come into contact with the voltage of the capacitors even if the connectors are used correctly, and if these connectors can be pulled off without the use of tools, the discharge must be possible within one minute. *(See EN 50178, section 5.2.5)*

For the setup of the discharge equipment it must be remembered that capacitors when switched off are charged to a direct voltage at the level of the network peak voltage.

The parallel operation of systems with conventional protective relaying and semiconductor technology is only possible for induced systems. Otherwise, the **thyroswitch** could be destroyed by charging effects.

3 Application range

The **thyroswitch** is particularly intended for systems with frequent and rapidly changing reactive power loads. The advantages of the **thyroswitch** compared to conventional technology are:

- High switching speed
- Switching performance with low system perturbation
- Switching without wearing parts
- Long working life thanks to practically unlimited frequency of operations

Fields of application:

- Cranes
- Lifts
- Welding equipment
- Molding presses
- Wind turbines

The power switch can be operated in conjunction with reactive power controllers, programmable logic controllers, computer systems and process controllers.

4 Installation

The thyroswitch should be installed vertically or max. 45° tilted. The integrated fan controls the air flow, so that nearly all the warm air produced is emitted in one direction.

Temperature-sensitive components installed near the device have to be protected accordingly. The safe distances specified must be observed.

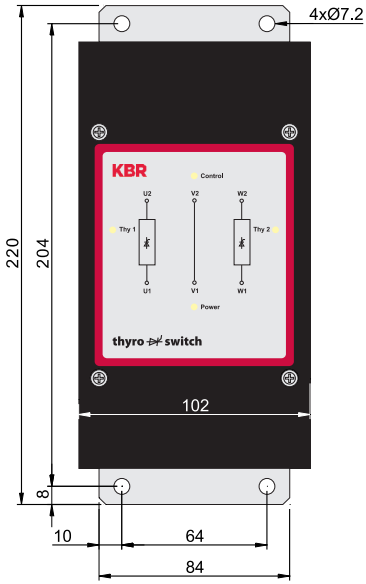
- Fan side: >50mm
- Heat sink outlet: >150mm

If the device is installed vertically, it must be ensured that the heat is always emitted upwards. When installing several **thyroswitches** on top of one another, cowls should be used.

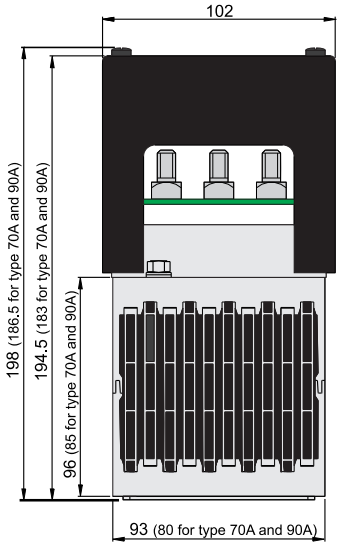
For rated load, there is an increase in temperature between fresh air and exhaust air of:

- max. 52°C for type 115A
- max. 40°C for type 90A
- max. 35°C for type 70A

115A-Typ



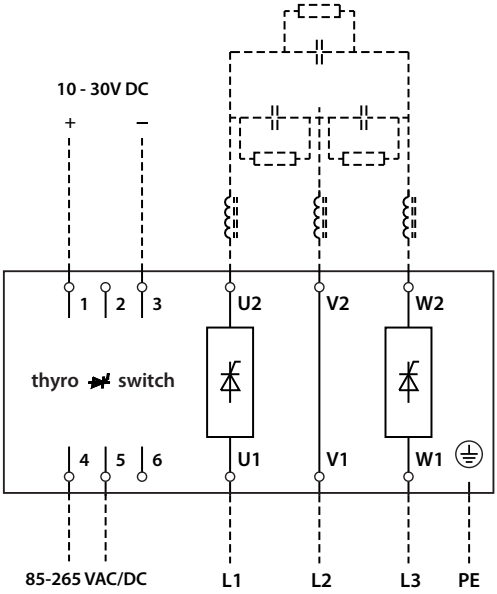
Draufsicht / top view



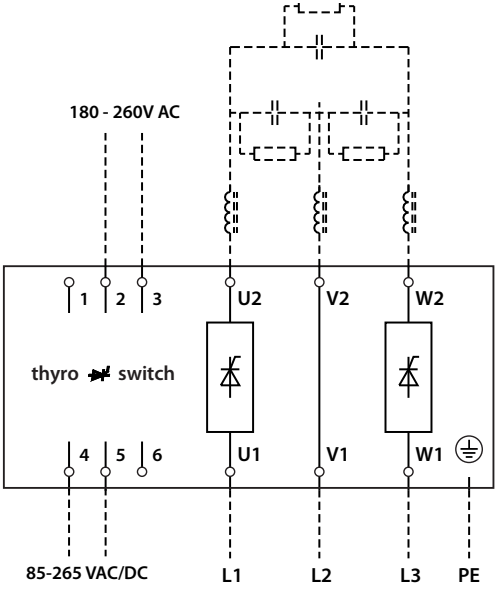
Rückansicht / back view

5 Connection

DC connection:



AC connection:



The load current with insulated crimping cable lugs with 8mm rings should be connected with terminal studs, tightened with a torque of 5.5 - 6Nm. The cable lugs must be positioned exactly vertically to the PCB. When wiring, it must be observed that the connections are not directly heated up by the air from the heat sinks. As load fuses, fuse units for the protection of semiconductors must be used. Their size must fulfill the requirements of the connected capacitive load. It must be ensured that the grounding conductor is connected correctly. The grounding conductor connection is an M6 hexagonal screw that can be found on the heat sink beneath the connections for the capacitor and is labeled with the grounding conductor sign.

In detuned systems, it is absolutely essential that the **thyroswitch** is connected before the inductor and capacitor.

Terminals 1(+) and 3(-): For 10-30V DC input, terminal 1 must be connected to plus and terminal 3 to minus.

Terminals 2 and 3: For 180-260V AC 50/60 Hz input, terminals 2 and 3 must be used.

Terminals 4 and 5: The supply voltage 200-250V AC or 85-265V AC with 50 or 60Hz is connected to terminals 4 and 5.

6 Start-up

1. Make sure that the **thyroswitch** is properly connected**.**
2. Attach the plastic housing.
3. Switch on the supply voltage ("Power" LED lights up)
4. If necessary, check the connection of the controller ("control" LED lights up and fan starts up).

Note: The load current may only be released for the first start-up if there is no connection, i. e. the **thyroswitch** is switched off.

6. Connect the load current.
7. Release the controller (if connected and functioning correctly, "Power", "Control", "Thyr1" and "Thyr2" light up).
8. The fan can be switched on permanently with a jumper.

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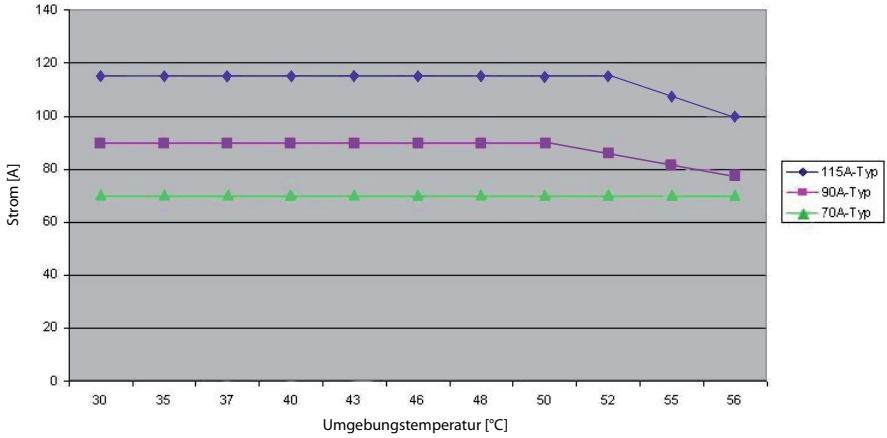
7 Performance limitation depending on ambient temperature



8 Model type overview

Special voltages and currents on request

9 Declaration of conformity

ENGLISH CE DECLARATION OF CONFORMITY

We declare that we have sole responsibility that this product (see table) meets the conditions of Directives 73/23/EEC and 89/336/EEC and corresponds to the following standards or reference documents:

EN 61010-1:2002-08; EN61010-1/B1:2002; EN 61010-1/B2:2004;

EN 61000-6-1:2007; EN 61000-6-2:2005; EN 61000-6-3:2007; EN 61000-6-4:2007

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